DOCUMENT RESUME

ED 441 831 TM 030 866

AUTHOR Yu, Lei; Rachor, Robert
TITLE The Two-Year Evaluation of the Three-Year Direct Instruction Program in an Urban Public School System.
PUB DATE 2000-04-00
NOTE 23p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 24-28, 2000).
PUB TYPE Reports - Evaluative (142) -- Speeches/Meeting Papers (150)
EDRS PRICE EDRS Price MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Disadvantaged Youth; *Elementary School Students; Evaluation Methods; *High Risk Students; *Instructional Effectiveness; Intermediate Grades; Language Arts; Program Evaluation; Public Schools; Reading Achievement; Urban Schools
IDENTIFIERS *Direct Instruction

ABSTRACT

Starting with the 1997-1998 school year, the Direct Instruction Reading/Language Arts Program was implemented in three elementary schools in a northwest urban public school system as a 3-year pilot study to improve the academic performance of at-risk students. Direct Instruction (DI) is aimed at providing effective learning for low-achieving elementary school students from disadvantaged backgrounds. DI was first implemented in 1968 at the University of Oregon in Eugene as part of Project Follow Through. Although the national evaluation of Project Follow Through favors the DI model in terms of both short- and long-term program effects, the findings from DI programs implemented across the United States are not always consistent. This study examines DI program effects on the reading ability of urban elementary school students at three grade levels who had been in the program for 2 consecutive years. Subjects were 93 fourth graders, 71 fifth graders, and 81 sixth graders. The evaluation reveals mixed findings. Performance of sixth grade DI schools was lower than that of sixth graders in control schools. (Contains 4 tables, 3 figures, and 22 references.) (SLD)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 441 831

The Two-Year Evaluation of the Three-Year Direct Instruction Program in an Urban Public School System

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Lei Yu

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2B

Lei Yu

University of Toledo

Robert Rachor

Toledo Public Schools

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Presentation at the Annual Meeting of

American Educational Research Association

New Orleans, LA

April, 2000

TM030866

BEST COPY AVAILABLE

Abstract

Starting with the 1997-98 school year, the Direct Instruction Reading/Language Arts Program was implemented in three elementary schools in a northwest urban public school system as a three-year pilot study to improve the academic performance of at-risk students. Direct Instruction (DI) is aimed at providing effective learning for low achieving elementary school students from disadvantaged backgrounds. Direction Instruction was first implemented in 1968 at the University of Oregon in Eugene as part of Project Follow Through. Although the national evaluation of Project Follow Through favored Direct Instruction model in terms of both short- and long-term program effects, the findings from DI programs implemented across the nation are not always consistent. Most of the literature reported positive effects of Direct Instruction while a few studies showed that it had little effect or even some disadvantages. This study examines DI program effects on the reading ability of students in three grade levels who had been in the program for two consecutive years. The evaluation revealed mixed findings.

Starting with the 1997-98 school year, the Direct Instruction Reading/Language Arts Program was implemented in three elementary schools in a northwest urban public school system as a three-year pilot study to improve the academic performance of at-risk students. Direct Instruction (DI), developed by Siegfried Engelmann in 1960s, is aimed at providing effective learning for low achieving elementary school students from disadvantaged backgrounds. The program's goal is to help students attain the same level of academic achievement as their middle-class peers (Becker and Engelmann, 1995).

DI is characterized by scripted and carefully sequenced lessons, rapid pacing and responses of the students in unison as well as in individual turns (Engelmann, 1980). Theoretically the program was based on two postulations: the learner has the capacity to learn any knowledge through examples and the capacity to generalize the obtained knowledge to new situations (Engelmann & Carnine, 1982). Two rules governing the selection of features in the model are "teach more in less time" and "control the details of what happens" (Engelmann, Becker, Carnine, & Gersten, 1988).

The first series of programs based on DI principles were published under the trade name DISTAR© (Direct Instruction Strategies for Teaching Arithmetic and Reading). Direction Instruction was implemented in 1968 at the University of Oregon in Eugene as part of Project Follow Through, a large-scale educational experiment conducted by the U.S. Department of Education in order to break the cycle of poverty through better education (Grossen, 1995). DI was one of the nine models of effective instruction approved by the Department of Education for schools to adopt. It turned out to be the most popular one adopted by schools.

The national evaluation of Project Follow Through and the comparisons between and among the models showed that the students who received Direct Instruction outperformed the

students in control groups and the students taught by other instructional approaches in reading, math, spelling and language (Engelmann, 1980; Carnine, Silbert & Kameenui, 1990). Student performance increased from the 20th percentile to the average levels of achievement, the common standard for all schools (Becker & Engelmann, 1995). The long-term academic effects on these children were also examined. It was found that children who received Direct Instruction performed consistently better than corresponding control groups in reading, spelling and math in the remaining years of elementary school (Gesten, Keating & Becker, 1988). Studies of high school students showed that students receiving DI had higher rates of graduation and were more likely to be accepted into college (Meyer, 1984; Gesten, Keating & Becker 1988).

Although the national evaluation of Project Follow Through favored the Direct Instruction model in terms of both short- and long-term program effects, the findings from DI programs implemented across the nation are inconsistent. In a study of three 12-week intervention programs (the average age of students = 10.11 years) Somerville & Leach (1988) found that the DI program resulted in significantly greater gains in reading performance than two other programs (psychomotor and self-esteem enhancement) and the control group. A study of elementary school students conducted by Brent & DiObilda (1993) showed that DI students were superior in mathematics on the Metropolitan Achievement Test (MAT) subtests and that they had the same level of achievement as the students of the traditional basal programs on the Comprehensive Test of Basic Skills (CTBS). In a study of three preschool programs Schweinhart & Weikart (1998) found that both the High/Scope group and the Nursery School group had a total of ten significant advantages over the DI group, but the DI group had no significant advantages over either of them. When these students were followed to the age of 23, both the High/Scope group and the Nursery School had two significant advantages over the DI group. One of the advantages was 43% of the

High/Scope group and 44% of the Nursery School group at some time up to the age of 23 engaged in volunteer work, as compared to 11% of Direct Instruction group.

DI's popularity waned in the late 1980s, when it was removed from California state curriculum and replaced by the then-popular whole language and whole math approach (Berlau, 1998). DI is making waves again in the 1990s (Duffrin, 1996; Berlau, 1998). Across the nation Direct Instruction has been implemented in 150 schools by January 1998 (American Institute for Research, 1999).

As mentioned above, the three-year DI program was implemented in three elementary schools in a large city school district in order to improve the academic performance of disadvantaged students. The complete Direct Instruction program was adopted, including all materials and teacher training. The teachers were trained preceding the implementation of the program and were also provided with on-going consultation from the provider for the duration of the program.

This three-year pilot program was to be evaluated annually using a matched sample posttest design. Students in DI schools were matched to students in similar schools on the basis of race, gender, free lunch status and their normal curve equivalent score or scale score on a pretest given in the second, third or fourth grade in March 1997. The current study examines the program effects on the reading ability of these students who had been followed for two years in terms of following objectives:

(1) Comparison of Direct Instruction students to a matched sample of students from similar schools on the March 1998 administration of the Riverside Publishing Third Grade Off Grade Reading Proficiency Test and the March 1999 administration of the State Fourth Grade Reading Proficiency Test.

(2) Comparison of Direct Instruction students to a matched sample of students from similar schools on the March 1998 administration of the State Fourth Grade Reading Proficiency Test and the 1999 administration of the Riverside Publishing Fifth Grade Off Grade Reading Proficiency Test; and

(3) Comparison of Direct Instruction students to a matched sample of students from similar schools on the March 1998 administration of the Riverside Publishing Fifth Grade Off Grade Reading Proficiency Test and the March 1999 administration of the State Sixth Grade Reading Proficiency Test.

Method

Sampling Procedure

Students who received two full years of Direct Instruction were compared to students in similar elementary schools who received traditional instruction. The study design provided for a cohort of DI and control group students who were followed for three years. Students in the control group were selected using a two-step process.

First, control schools were selected by matching each of the three Direct Instruction schools with schools of similar levels of poverty and percentages of majority/minority students. Second, students were selected from the initial sample for both Direct Instruction and control groups, if they were in the same school for the appropriate grade level reading achievement tests (March 1997), the official student count in the fall of 1997 and the appropriate grade level reading achievement tests (March 1998 and 1999). Each student in the Direct Instruction schools was matched with a similar student in one of the control schools on the basis of race, gender, free lunch status, and the reading achievement test score in March 1997. The three tests used to match students in three grade levels were the Second Grade Metropolitan Achievement Reading Comprehension Test (MAT), the

Riverside Publishing Third Grade Off Grade Reading Proficiency Test and the State Fourth Grade Reading Proficiency Test. Matching revealed that there was an exact match between Direct Instruction and control students on race and gender; in some cases the free lunch status and/or the exact reading score were difficult to match. In those cases, the closest possible match was made. Statistical tests show that there was no significant difference between the DI and control students on the pretest measure, race, gender and free lunch status.

Measures

The posttest measures concerning the three grade levels are tests officially administered in the school district each year. They are the Riverside Publishing Off Grade Reading Proficiency Test (third and fifth grades) and the State Reading Proficiency Test (fourth and sixth grades).

Subjects

Ninety-three fourth grade students (1998-99) in three DI schools who had been in the program for two full years were matched with similar students in control schools. Table 1 shows the descriptive characteristic of the fourth grade sample.

INSERT TABLE 1 ABOUT HERE

Seventy-one fifth grade students (1998-99) in three DI schools who had been in the program for two full years were matched with similar students in control schools. Table 2 shows the descriptive characteristic of the fifth grade sample.

INSERT TABLE 2 ABOUT HERE

Eighty-one sixth grade students (1998-99) in three DI schools who had been in the program for two full years were matched with similar students in control schools. Table 3 shows the descriptive characteristic of the sixth grade sample.

INSERT TABLE 3 ABOUT HERE

Analysis

Repeated measures design was used in conducting the analysis as the three grades were measured in two consecutive years. In repeated measures design total variability is partitioned into orthogonal linear contrasts. The variability due to individual differences is removed from the error term, therefore, power is increased and statistical precision is enhanced.

Results

Three repeated measure analyses were conducted respectively for each of the three grade levels. The between-subject factor is the grouping variable (treatment versus control) and the within-subject factor is test occasion, which has two levels. 1 refers to the first year (1998) a test was given and 2 the second year (1999) a test was given. Test scores for a grade given on different occasions are incomparable as they are different tests developed by different publishers. Therefore, differences between scores on two tests are not of interest in this study. Because the control and treatment groups were sampled in such a way as to minimize their initial difference, assumption of sphericity is tenable for all three analyses. Univariate results are identical to multivariate results. Descriptive statistics of test results for the three grades are summarized in Table 4.

INSERT TABLE 4 ABOUT HERE

In the repeated measures analysis of Grade 4 (1998-99 school year) results show that there are no significant main effects for test occasion and group, but a significant interaction exists between them, F (1, 184) = 5.27 and p = .02. This indicates that the effect of the level of one variable is not the same across the levels of the other variable. That is, DI and control group had significantly different performance on two tests. Simple main effects were conducted to locate the differences and it was only found that the control group performed significantly better on the second test than on the first test, F (1, 184) = 7.44 and p = .01 (see Figure 1).

INSERT FIGURE 1 ABOUT HERE

Figure 1 also demonstrates that the difference between DI and control group was more dramatic on the first test than that on the second test, although this difference was not statistically significant. It may suggest that there was some program effect in the first year implementation of DI, but the effect was not large enough for a difference to be detected by the analysis.

In the repeated measures analysis of Grade 5 (1998-99 school year) results show that there are significant main effects for both group, $F(1, 140) = 4.75$, $p = .03$, and test occasion, $F(1, 140) = 6.67$ and $p = .01$. The significant main effect for group indicates that the difference between the mean for DI group and the mean for control group, averaged across two tests, was too great to attribute to sampling fluctuation. The significant main effect for test occasion indicates that the difference between the score means for two tests, averaged over both DI and control students, was too great to attribute to sampling fluctuation. As there are only two levels for group and test occasion, post hoc tests are not necessary. Cell means were plotted and showed (see Figure 2) that

(1) the average score of DI group was significantly higher than that of the control group on each of the two tests; and

(2) both DI and control groups had significantly higher average scores on the first test than on the second test.

INSERT FIGURE 2 ABOUT HERE

As no interaction existed between group and test occasion, the lines in the Figure 2 remain parallel. This indicates that there was a consistent significant difference between DI and control groups in reading achievement over the two years.

In the repeated measures analysis of Grade 6 (1998-99 school year) results show that there are no significant main effects for test occasion and group, but a significant interaction exists

between them, F (1, 160) = 29.45 and p = .00. This indicates that DI and control group had significantly different performance on two tests. Simple main effects were conducted to locate the differences and the following are findings (see Figure 3):

INSERT FIGURE 3 ABOUT HERE

(1) The average of DI group was significantly higher on the first test than on the second test, F (1, 160) = 9.97 and p = .00;

(2) The average of the control group was significantly higher on the second test than on the first test, F (1, 160) = 20.17 and p = .00; and

(3) The average of the control group was significantly higher than that of DI group on the second test, F (1, 160) = 10.83 and p = .00.

Discussion

The two-year evaluation shows mixed findings about of the effect of the Direct Instruction program. One of the findings is that students receiving Direct Instruction had significantly higher reading achievement level compared to a matched sample of control group students. This program effect was demonstrated in the two-year implementation in Grade 5 (1998-99). DI schools not only outperformed control schools in reading achievement on the State Fourth Grade Reading Proficiency Test (March 1998) and Riverside Publishing Fifth Grade Off Grade Reading Proficiency Test (March 1999); the same magnitude of difference between these schools was maintained for two consecutive years. The probability was greater than 97% that the differences that existed between students receiving Direct Instruction and the control group students did not occur by chance. This result was consistent with the findings of Engelmann (1980) and Carnine, Silbert & Kameenui (1990).

Another finding is the similar performance of the DI and control students for Grade 4 (1998-99) on Riverside Publishing Third Grade Off Grade Reading Test (March 1998) and the State Fourth Grade Reading Proficiency Test (March 1999). Although the plot of cell means may indicate some program effect for the first year test, the effect was not large enough to be detected by the analysis. This result was consistent with one of the findings of Brent & DiObilda (1993). For Grade 6 DI and control schools had similar performance on the Riverside Publishing Fifth Grade Off Grade Reading Test (March 1998), but control schools outperformed DI schools on the State Sixth Grade Proficiency Test (March 1999).

Much like the findings in this study, there has always been contention about the effect of Direct Instruction (Wells, 1998; Levin, 1987, & Parks, 1988). In fact Direct Instruction has been criticized for emphasizing endless repetition of material through drill-and-practice, omission of interesting applications and assignment in favor of drudgery, which resulted in the lack of vitality and low self-expectations for the school experience of the disadvantaged students (Levin, 1987). As can be seen from above analyses, Direct Instruction demonstrated both its effectiveness and ineffectiveness in this evaluation.

Conclusion

The most significant result of this study was the disappointing results of Grade 6, where the control schools outperformed DI schools. If students in different grade levels performed differently while using the same model, apparently a lot of other factors may contribute to these differences.

Wells (1998) noted that Direct Instruction is only one of the ways in which a teacher can assist students in improving their academic performance. Sometimes it is extremely effective; but there are occasions when it is counterproductive. There are no universally valid recommendations and which method to use is context-specific. As each classroom community is different, educators

and decision-makers should select a method that is appropriate for their situation and that can extend the students' ability as much as possible.

Low student achievement in elementary schools with high rates of poverty across the country is a major concern for educators and the public. If indeed, education is one of the keys to increasing economic opportunities for poor children, then these findings should be of interest to educators and school policy makers across the country and in their decisions to choose and implement instructional programs.

Table 1

Sample Characteristics of Third Grade Students Matched on MAT Reading Test Administered in March 1997

	Race		Gender		Free Lunch Status		Pretest Score		
Group	Black	Hispanic	Male	Female	Free	Nonfree	M	SD	N
DI	99%	01%	38%	62%	75%	25%	48.99	14.55	93
Control	99%	01%	38%	62%	79%	22%	49.02	14.47	93

Table 2

Sample Characteristics of Fourth Grade Students Matched on the Riverside Publishing Third Grade Off Grade Reading Proficiency Test Administered in March 1997

	Race		Gender		Free Lunch Status		Pretest Scale Score		
Group	Black	White	Male	Female	Free	Nonfree	M	SD	N
DI	96%	04%	48%	52%	83%	17%	213.65	12.53	71
Control	96%	04%	48%	52%	82%	18%	213.14	12.66	71

Table 3

Sample Characteristics of Fifth Grade Students Matched on the State Fourth Grade Reading Proficiency Test Administered in March 1997

	Race		Gender		Free Lunch Status		Pretest Scale Score		
Group	Black	White	Male	Female	Free	Nonfree	M	SD	N
DI	99%	01%	37%	63%	62%	38%	207.96	13.17	81
Control	99%	01%	37%	63%	56%	44%	207.91	13.36	81

Table 4

Summary Statistics of Test Scores in Two Years for the Three Grade Levels

	1998-99 School Year			1997-98 School Year		
	N	M	SD	N	M	SD
Grade 4						
Treatment	93	207.38	13.75	93	208.30	15.20
Control	93	208.87	17.58	93	204.00	18.87
Grade 5						
Treatment	71	209.52	20.16	71	207.13	12.28
Control	71	205.46	18.42	71	200.92	12.18
Grade 6						
Treatment	81	201.20	25.30	81	207.42	21.33
Control	81	213.80	23.42	81	204.95	24.86

Figure 1. Plot of cell means for Grade 4.

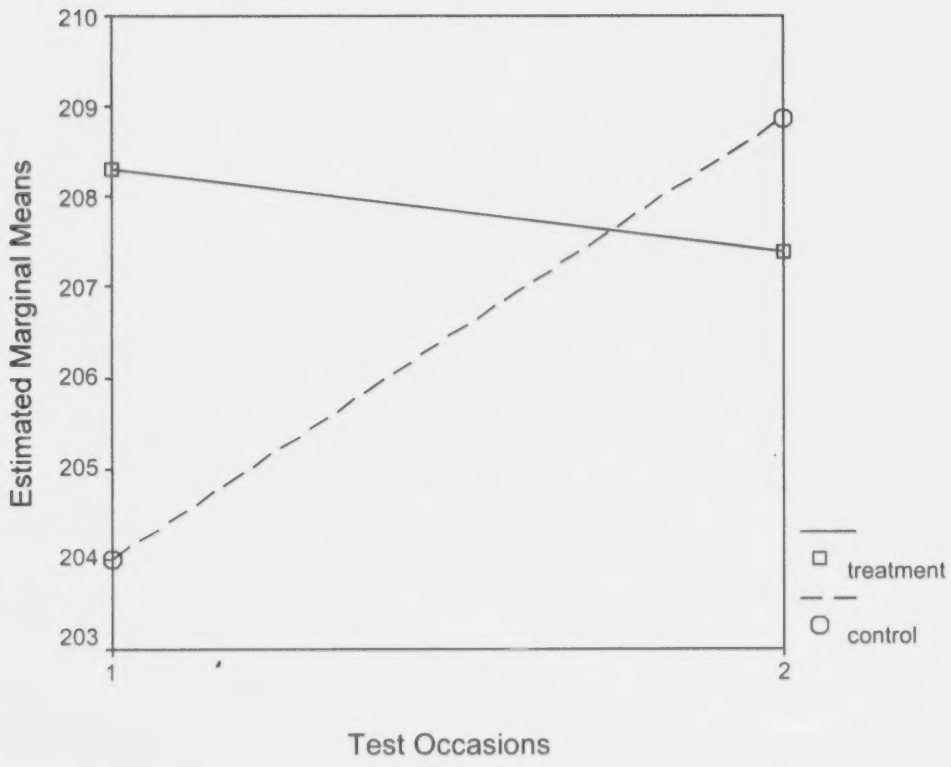


Figure 2. Plot of cell means for Grade 5.

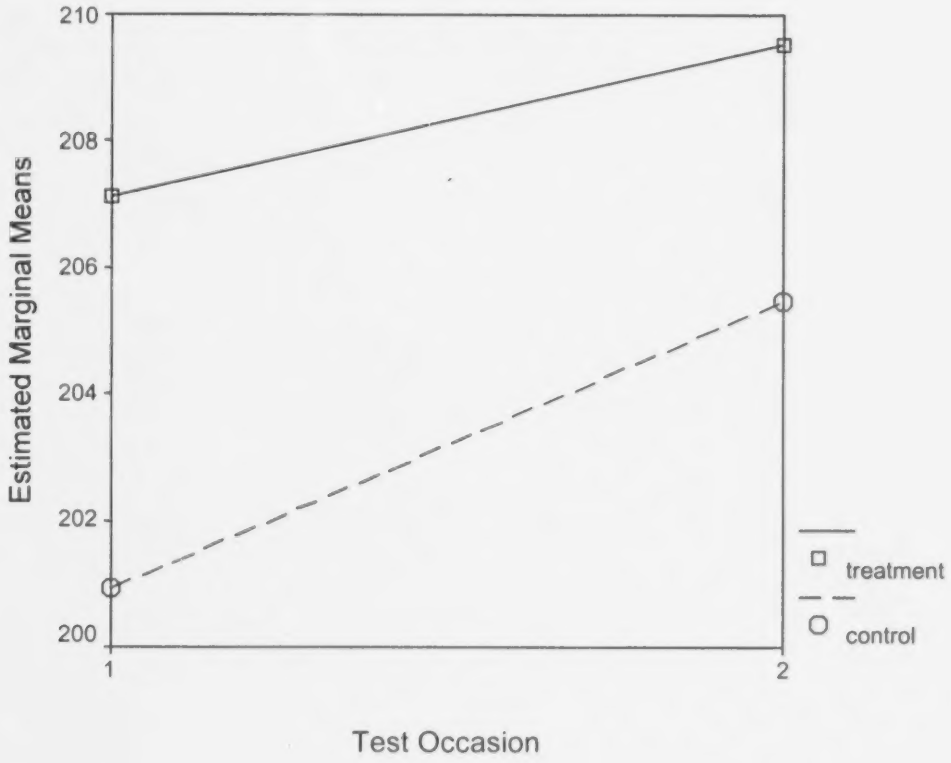
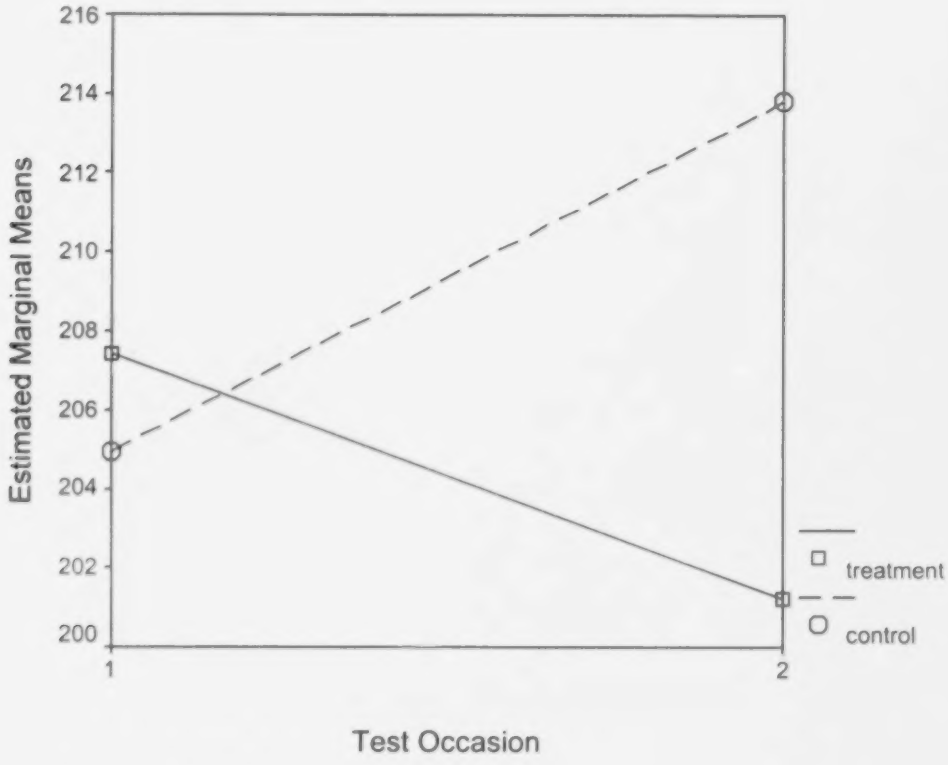


Figure 3. Plot of cell means for Grade 6.



References

American Institute for Research. (1999). An Educator's Guide to Schoolwide Reform. Arlington, VA: Educational Research Service.

Becker, W.C, & Engelmann, S. (1995-6, Winter). Sponsor findings from Project Follow Through. Effective School Practice, 15(1).

Berlau, J. (1998, April 21). Direct Instruction's comeback. Investor's Business Daily.

Brent, G. & DiObilda, N. (1993, Jul-Aug). Effects of curriculum alignment versus Direct Instruction on urban children. Journal of Educational Research, 86(6), 333-338.

Carnine, D., Silbert, J., & Kameenui, E. (1990). Direct Instruction Reading. Columbus, OH: Merrill Publishing Company.

Duffrin, E. (1996, September). Direction Instruction making waves. Catalyst, 8(1).

Engelmann, S. (1980). Direct instruction. Englewood Cliffs, NJ: Educational Technology Publications.

Engelmann, S., Becker, W. C., Carnine, D., & Gesten, R. (1988). The Direct Instruction Follow Through model: Design and outcomes. Education and Treatment of Children, 11(4), 303-317.

Engelmann, S., & Carnine, D. (1982). Theory of instruction: Principles and applications. New York, NY: Irvington Publishers.

Gesten, R., & Keating, T. (1987). Long-term benefits from Direct Instruction. Educational Leadership, 44(6), 28-29.

Gesten, R., Keating, T., & Becker, W. (1998). The continued impact of the Direct Instruction model: Longitudinal studies of Follow Through students. Education and Treatment of Children, 11(4), 318-327.

Grossen, B. (1995-6, Winter). The story behind Project Follow Through. Effective School Practice, 15(1). Retrieved July 5, 1999 from the World Wide Web: http://darkwing.uoregon.edu/~adiep/ft/grossen.htm

Hedges, L. V., & Olkin, I. (1985). Statistical methods for meta-analysis. Orlando, FL: Academic Press.

Levin, H. M. (1987). Accelerated Schools for disadvantaged students. Educational Leadership, 44(6),19-21.

Lloyd, J. W., Forness, S. R., & Kavale, K. A. (1998). Some methods are more effective than others. Intervention in School and Clinic, 33(4), 195-200.

Meyer, L.A., (1984). Long-term academic effects of the Direct Instruction Project Follow Through. Elementary School Journal, 84(4), 380-404.

Parks, D. (1988, Jan-Apr). Direct Instruction and the disadvantaged. Negro Educational Review, 39(1-2), 28-32.

Schweinhart, L. J., & Weikart, D. P. (1998). Why curriculum matters in early childhood education. Educational Leadership, 55(6), 57-60.

Somerville, D. E. & Leach, D. J. (1988). Direction or indirection instruction?: An evaluation of three types of intervention program for assisting students with specific reading difficulties. Educational Research, 30(1), 46-53.

Psychological Corporation. (1985). Metropolitan Achievement Tests (6th ed.). San Antonio, TX: Psychological Corporation.

Riverside Publishing. (1995). Off-Grade Proficiency Test (2nd ed.). Workman Publishing Company.

Wells, G. (1998, September). Some questions about Direct Instruction: Why? To whom? How? And when? Language Arts, 76(1), 27-35.